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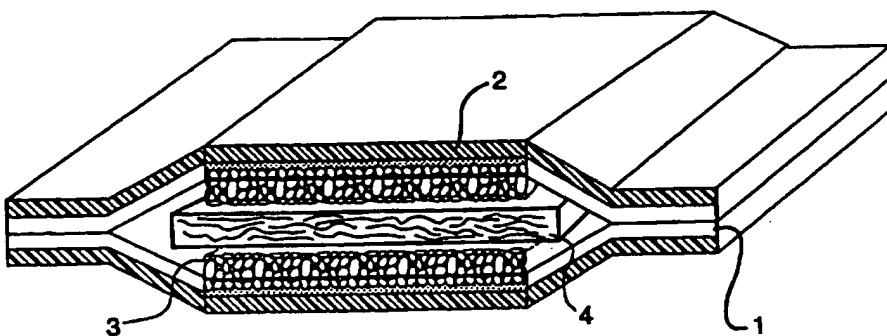
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(54) Title: METHOD AND MATERIAL FOR EXTENDING THE SHELF-LIFE OF FRESH FOODS



(57) Abstract

A method of extending the shelf-life of fresh foods, such as meat, poultry, seafood, vegetables and fruit, uses a sheet comprising a film with a layer of adhesive and a curing or marinating agent attached to the film by the adhesive. The food is sealed in the sheet, with the curing or marinating agent in intimate contact with the food, and the package is maintained at a temperature of about 0 °C until the food is substantially cured or marinated.

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**METHOD AND MATERIAL FOR EXTENDING  
THE SHELF-LIFE OF FRESH FOODS**

**FIELD OF THE INVENTION**

The invention concerns extending the shelf-life of fresh food products. More particularly, it is directed to a sheet for wrapping fresh food products and to a method of extending their shelf-life using the sheet.

**BACKGROUND OF THE INVENTION**

Methods are known for curing or marinating fresh food products using various chemical formulations. Examples include the curing of meat using sodium chloride and curing salts comprising nitrates and nitrites: Canadian Patent 905,744 (Komarik) and U.S. Patent 3,526,521 (Komarik); improving shelf life characteristics using a composition comprising a phosphate, ascorbic acid and citric acid: U.S. Patent 4,818,548 (Cheng). Methods are known for protecting food against microorganisms using preserving liquids: Canadian Patent 1,329,890 (Saitoh) and Canadian Patent Application 2,100,074 (Sekiyama); for marinating meat by means of a marinating liquid: U.S. Patent 3,537,864 (Magiera); and for transferring modifiers and flavorings to food from their packaging: Canadian Patent Applications 2,007,522 (Ito et al.) and 2,049,271 (Juhl). However, the known methods do not enable food processors to extend the shelf-life of fresh food products, such as fresh meat,

poultry, fish, vegetables or fruit, by packaging such products and curing or marinating the foods in their own packaging at the low temperatures found in food chillers, resulting in food products with an extended shelf-life ready  
5 for the consumer to eat or cook.

#### SUMMARY OF THE INVENTION

We have invented a sheet for wrapping fresh foods in order to cure or marinate them at low temperatures to extend their shelf-life. The sheet comprises three components,  
10 namely (i) a film acceptable for contacting food, (ii) a layer of edible adhesive applied to one side of the film, and (iii) a curing or a marinating agent adhered to the film by the adhesive.

Our method of extending the shelf-life of fresh foods using the sheet comprises sealing a portion of fresh food between two sheets so that the curing or marinating agent is in intimate contact with the food, and maintaining the sealed food at a low temperature until the food is substantially cured or marinated. At that time, the food  
15 can be used by a consumer, or maintained at low temperature during its extended shelf-life until purchased for use, or  
20 it can be frozen for storage.

#### BRIEF DESCRIPTION OF THE DRAWINGS

In drawings which illustrate embodiments of the invention,  
25

Figure 1 is a cross-section of the sheet;

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Figure 2 is a sectional view of a food portion wrapped between two sheets; and

Figure 3 is a graph of the total plate count of Gravad Lax Atlantic salmon packaged according to the invention as a function of days of storage at 2°C.

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

The method of extending shelf-life according to the invention uses a packaging material illustrated in Figure 1. It comprises a film 2, adhesive 1 and curing or marinating agent 3. These together comprise sheet 5.

The film can be any film, foil or laminate that is suitable for contact with food. Suitable films are described in Plastic Films for Packaging, C.J. Benning, Technomic Publishing Inc., (1983), Ch. 6, and in Canadian Patent Application 2,086,481 (Kilton). The film can be made of such materials as polyvinyl chloride, polyethylene, polypropylene, polystyrene, polyamides and polyesters. It can also be a metal foil or metallized film. The term "film" in this specification is intended to encompass all suitable films, foils and laminates. The film is of a thickness commonly used for food packaging films, typically between .001" and .020".

In one embodiment of the invention, the food is vacuum packed in a bag or container after being wrapped between two sheets 5. In such case, the film need not be impermeable to air and microorganisms since that function is fulfilled by the bag or container. However, where no vacuum

bag or container is used and the sheet 5 is the only wrapping for the food, film 2 should be impermeable to air and microorganisms.

The adhesive that forms layer 1 is an edible substance whose function is to adhere the curing or marinating agent to the film at desired loadings of the agent during the packaging operation. The adhesive chosen for a particular fresh food product should be one which dissolves in the juices or fluids of the food product at temperatures around 0°C. This characteristic is important in reducing the moisture in the wrapped food product and thus contributing to extending its shelf-life. The preferred adhesive is a mixture of a natural polysaccharide, such as maltodextrin, with whey protein concentrate, water and a viscosity modifier. Suitable adhesives are described in U.S. Patent 4,501,758 (Morris). The preferred adhesive is prepared by blending together 40-50% by weight maltodextrin, 5-15% by weight whey protein concentrate, up to 1% xanthan gum and 40-50% water. The adhesive should have a consistency that makes it suitable for application to the film. The xanthan gum is a viscosity modifier added to optimize the consistency of the adhesive.

The curing or marinating agent 3 is a substance capable of curing or marinating the particular fresh food at low temperatures, i.e. at temperatures around 0°C. In this specification, the term "curing or marinating agent" means any edible composition effective for curing or marinating fresh foods at temperatures around 0°C. It can be a mixture

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of substances and may be in the form of chips, powders, irregular pieces and other forms. Powdered materials having a high surface area are preferred in order to have a maximum effect on the fresh food product.

The curing or marinating agent permits the food product to remain commercially acceptable after aging in a sealed package; absent such agent, the food product would not be in commercially acceptable condition after aging. In the case of red meat, the agents used are referred to as curing agents; in the case of fish and other seafood, as marinating agents. Preferred curing or marinating agents may include mixtures of various of the following substances: vinegar, sugar, beef base, salt, glucose solids, hydrolysed plant protein, hydrogenated peanut oil, yeast extract, sugar, citric acid, cream of tartar, herbs, spices and flavorings.

For aging red meat, a curing agent that can be used is a powdered mixture of sugar, beef base, salt, glucose solids, hydrolysed plant protein, hydrogenated peanut oil, yeast extract, spices, flavorings and dried cranberries.

For curing fresh salmon, a marinating agent that can be used is a powdered mixture of salt, sugar, citric acid, cream of tartar, herbs, spices and flavorings. Marinating agents usually include an acidic component, such as citric acid.

Depending on the application, meat stocks, edible acids and preservatives, natural and artificial flavoring

agents and various herbs and spices can be included in the curing or marinating agent.

The fresh food products to be processed according to the invention can be any fresh foods that can be cured, 5 marinated during aging at low temperatures, including meat, seafood, poultry, vegetables and fruit.

To prepare the sheet 5, the adhesive is evenly applied to one side of the film by conventional means such as spraying, rolling or brushing. The thickness of the adhesive layer is made sufficient to permit the desired loading of curing or marinating agent to adhere to the film. 10 Preferably, about 15-25 g/m<sup>2</sup> of adhesive is applied. The curing or marinating agent is then sifted onto the adhesive-covered surface of the film. Any excess curing or 15 marinating agent is removed by vibration or gravity. The preferred loading is in the range of 80-160 g/m<sup>2</sup>. The sheet can be rolled for future use or cut into sheets of a size suitable for a particular application.

In order to carry out the method of the invention, 20 a portion of fresh food is placed between two sheets, with the agent in intimate contact with the food, and is sealed, preferably vacuum sealed. Figure 2 illustrates a food product 4 between two sheets. Alternatively, the food can be placed between two sheets and placed in a bag or 25 container which is then vacuum sealed. It is also possible to wrap and seal the food product in a single sheet, but it is considered more convenient to use two sheets, one lower and one upper, in the packaging operation. All of these

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wrapping and sealing operations can be carried out with commercially-available food processing equipment well known to persons in the food-packaging industry.

In one embodiment of the invention, the film 2 is coated with adhesive and curing or marinating agent on both sides thereof. Portions of food can be wrapped in contact with both sides of such a sheet, making a package of two food portions. Similarly, a package of many food portions can be made by using a plurality of sheets coated on both sides.

The sealed food product is maintained at a low temperature in a chiller at least until the food is substantially cured or marinated. In this specification, "low temperature" means a temperature within a few degrees of 0°C. The chiller temperature is preferably in the range of -3°C to +4°C, more preferably -1°C to +4°C, the particular temperature depending on the particular food product.

Curing and marinating times vary widely with the fresh food product. Red meat is preferably maintained at -3°C to +2°C for 15-35 days, depending on the grade of meat. Salmon is preferably maintained at 0°C for 3-5 days. The packaged food product has then been aged and cured or marinated, and has an extended shelf-life. It is ready for consumer use. It can also be maintained in the chiller during its effective shelf-life, or it can be frozen for storage for future use.

Figure 3 shows the total plate count (logarithm of the colony-forming units per gram) at 30°C of Gravad Lax

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Atlantic salmon packaged for marinating in accordance with the invention at 2°C, at intervals after the date of packaging. The pH of the marinating agent is 3.6. The graph shows that even after 25 days, the total plate count is well below the USDA suggested level for ready-to-eat meat products.

5 The following examples illustrate embodiments of the invention.

Example 1

10 An adhesive composition was prepared by blending 45% by weight maltodextrin (supplied by UFL Foods Inc., Montreal, Quebec), 10% by weight whey protein concentrate (supplied by Ault Foods Limited of Winchester, Ontario), 0.5% xanthan gum and about 44% by weight of water, until the mixture had a smooth consistency. An even coating of this adhesive was applied by means of a roller to a film. Curlam 8088-K (trademark) plastic film manufactured by Curwood Packaging (Canada) Ltd. with a thickness of .0035" was used. About 20 g/m<sup>2</sup> of adhesive was applied to the film.

15 The sheet was then ready for the application of curing or marinating agents as described in the following examples.

20

Example 2

25 Onto the adhesive-covered surface of the film of Example 1 was sprinkled a curing agent comprising 30% sugar, 16% beef base, 16% chicken base, 10% celery salt, 8% paprika, 5% yeast extract, 5% black pepper, 5% salt,

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3% onion powder, 1% garlic powder and 1% parsley. About 90 g/m<sup>2</sup> of the agent was loaded. Portions of fresh rib eye and sirloin steaks were placed between two sheets, with the curing agent in intimate contact with the steaks. These were placed in a bag and vacuum sealed. The packaged products were stored in a chiller at a temperature between -1°C and +1°C for 21 days. The packaged products were then ready to either be cooked by a consumer, or maintained in a chiller during their extended shelf-life, or frozen for storage.

Example 3

Onto the adhesive-covered surface of the film of Example 1 was sprinkled a marinating agent comprising 40% salt, 30% sugar, 23.5% pepper, 0.5% dill, 5% citric acid and 1% cream of tartar. The pH of the marinating agent was adjusted to less than 3.6 using the citric acid and cream of tartar. About 90 g/m<sup>2</sup> of marinating agent was loaded. Portions of fresh salmon fillets, having the skin and pin bones removed, were placed between two suitable-sized sheets, placed in a bag and vacuum sealed. The packaged products were stored in a chiller at 2°C for 4-6 days. At this time, the package was ready to be cooked, or maintained in the chiller during its extended shelf-life, or frozen.

While specific compositions suitable as adhesives and as curing or marinating agents have been described in the specification, many other such compositions could be formulated by persons skilled in the art. All such

compositions are considered to be within the scope of our invention, which is defined in the following claims.

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**WHAT IS CLAIMED IS:**

1. A method of extending the shelf-life of fresh foods comprising:

(a) wrapping a portion of fresh food in a sheet comprising

(i) a film suitable for contact with food;

(ii) a layer of edible adhesive applied to one side of said film, said adhesive being adapted to dissolve in fluid from said food at a low temperature; and

(iii) a curing or marinating agent adhered to said film by said adhesive;

such that said curing or marinating agent is in intimate contact with said food;

(b) sealing said wrapped food in a container that is substantially impermeable to air and microorganisms; and

(c) maintaining said sealed food at said low temperature at least until said food product is substantially cured or marinated.

2. A method according to claim 1 wherein said low temperature is in the range -3°C to +4°C.

3. A method according to claim 2 wherein said food is red meat.

4. A method according to claim 3 wherein said low temperature is in the range -3°C to +2°C.

5

5. A method according to claim 4 wherein said sealed food is maintained at said low temperature for at least 15 days.

6. A method according to claim 2 wherein said food is salmon.

7. A method according to claim 6 wherein said low temperature is about 0°C to +2°C.

10

8. A method according to claim 7 wherein said sealed food is maintained at said low temperature for at least 4 days.

9. A method according to claim 2 further including the step of evacuating air between said food and said sheet.

15

10. A method according to claim 2 wherein said edible adhesive composition comprises maltodextrin, whey protein concentrate, a viscosity modifier and water.

11. A method according to claim 1 wherein said fresh food is meat, seafood, poultry, vegetables or fruit.

12. A method of extending the shelf-life of fresh foods comprising:

(a) sealing a portion of fresh food in a sheet comprising

(i) a film that is substantially impermeable to air and microorganisms and is suitable for contact with food;

(ii) a layer of edible adhesive applied to one side of said film, said adhesive being adapted to dissolve in fluid from said food at a low temperature; and

(iii) a curing or marinating agent adhered to said film by said adhesive;

such that said curing or marinating agent is in intimate contact with said food; and

(b) maintaining said sealed food at said low temperature at least until said food product is substantially cured or marinated.

13. A method according to claim 12 wherein said low temperature is in the range -3°C to +4°C.

14. A method according to claim 13 wherein said edible adhesive composition comprises maltodextrin, whey protein concentrate, a viscosity modifier and water.

15. A method according to claim 12 wherein said fresh food is meat, seafood, poultry, vegetables or fruit.

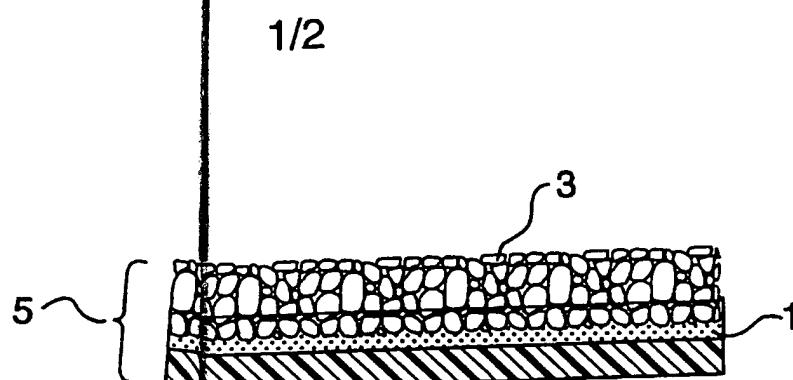
16. A sheet for wrapping a portion of fresh food in order to extend the shelf-life of said food comprising:

- (a) a film suitable for contact with food;
- (b) a layer of edible adhesive applied to one side of said film; and
- (c) a curing or marinating agent adhered to said film by said adhesive.

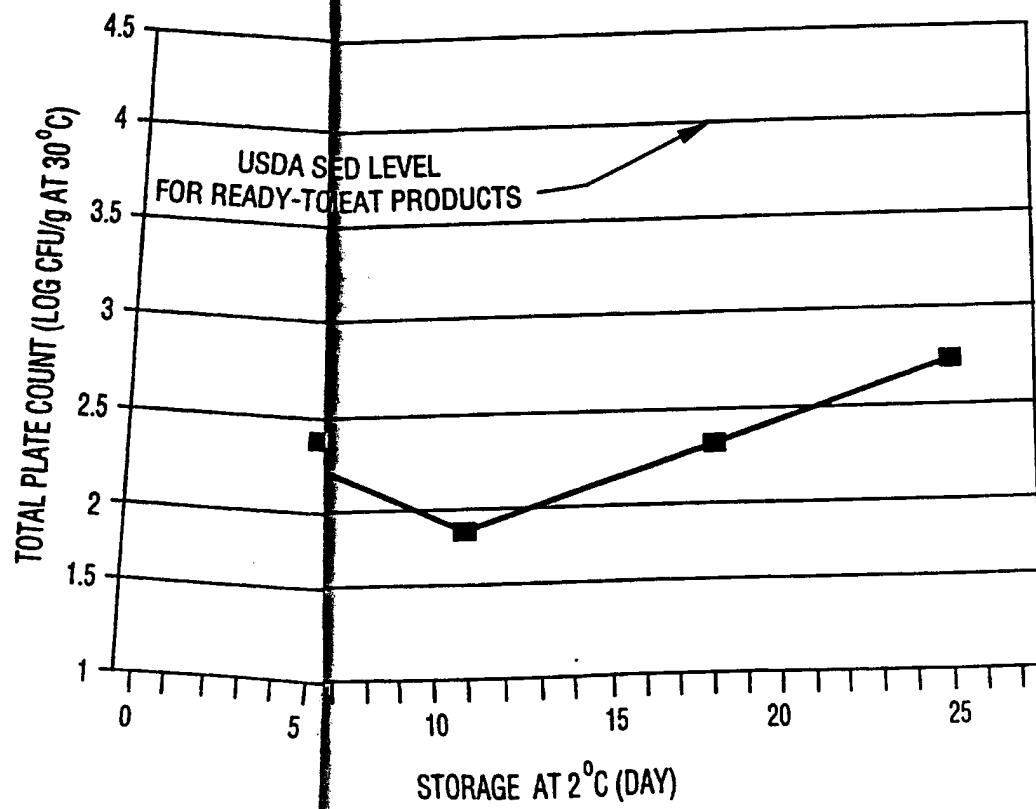
17. A sheet according to claim 16 wherein said edible adhesive composition comprises maltodextrin, whey protein concentrate, a viscosity modifier and water.

18. A sheet according to claim 16 wherein said film has a layer of said adhesive applied to the second side of said film and a curing or marinating agent adhered to said second side.

19. A sheet according to claim 16 wherein said fresh food is meat, seafood, poultry, vegetables or fruit.



**FIG. 1**



**FIG. 3**

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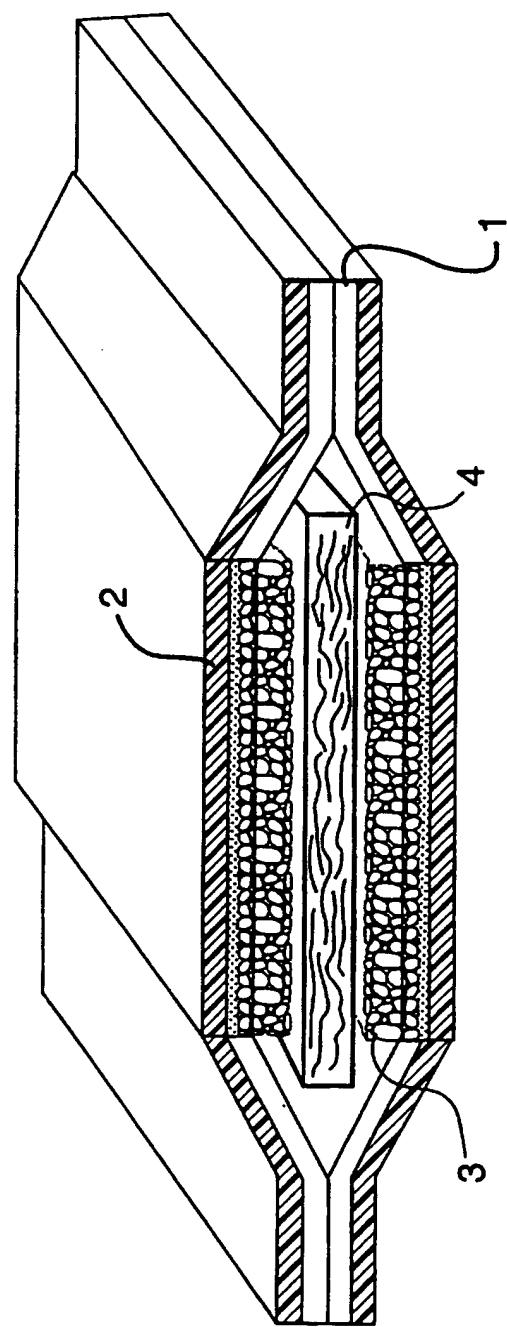


FIG. 2

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## INTERNATIONAL SEARCH REPORT

International Application No.  
PCT/CA 95/00632

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 6 A23L3/34 A23B7/153 A23B4/18 B65D81/34 B65D81/28  
 B29D7/01

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
 IPC 6 A23L A23B B65D B29D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CA,A,1 053 497 (BRISTOL MYERS CO) 1 May 1979	1,3,8, 11,12, 15,16, 18,19 1-19
Y	see page 6 - page 7; examples 1,3 ---	16,19
X	PATENT ABSTRACTS OF JAPAN vol. 007 no. 011 (C-145) ,18 January 1983 & JP,A,57 170175 (FUROINTO SANGYO KK) 20 October 1982, see abstract ----- -/-	

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

## \* Special categories of cited documents :

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1

Date of the actual completion of the international search

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p><b>DATABASE WPI</b>            Section Ch, Week 8248            Derwent Publications Ltd., London, GB;            Class D13, AN 82-02888J            &amp; JP,A,57 170 176 ( TOPPAN PRINTING KK) ,            20 October 1982            see abstract</p> <p>---</p>	1-19
Y	<p>EP,A,0 473 091 (VISKASE CORP) 4 March 1992            cited in the application            see page 5 - page 6            see page 8, last paragraph; example 3</p> <p>---</p>	1-19
Y	<p><b>DATABASE WPI</b>            Section Ch, Week 8330            Derwent Publications Ltd., London, GB;            Class A96, AN 83-719706            &amp; JP,A,58 101 670 ( TOPPAN PRINTING KK) ,            16 June 1983            see abstract</p> <p>-----</p>	1-19

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

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CA-A-1053497	01-05-79	NONE		
EP-A-0473091	04-03-92	AT-T- 132075	15-01-96	
		AU-B- 636054	08-04-93	
		AU-B- 8274791	05-03-92	
		CA-A- 2049271	01-03-92	
		JP-A- 7003045	06-01-95	
		PT-A- 98789	29-10-93	
		US-A- 5382391	17-01-95	
		US-A- 5374457	20-12-94	
		US-A- 5288532	22-02-94	

